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(54) **Water heater**

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EP 0 623 784 B1

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Description

The invention relates to water heaters, and more particularly to water heaters having a combustion chamber and an air inlet pipe communicating with the combustion chamber.

It is known to provide an air scoop at the inlet end of an air inlet pipe to direct air into the inlet pipe. It is also known to provide a directionally adjustable ventilated cover at the inlet end to prevent the introduction of water or other unwanted debris into the inlet pipe.

EP-A-0255919 discloses a water heater including an air inlet pipe including an outlet end communicating with a combustion chamber and an inlet end located outside of the building containing the water heater. In use, air is drawn through the inlet pipe to the combustion chamber.

US-A-4016730 describes an arrangement in which the outer end of a pipe is provided with a plate-like formation to reduce air flow across the end of the pipe thus reducing the risk of air flow through the pipe in the reverse direction.

According to the present invention there is provided a water heater comprising:

- a tank defining a water chamber;
- a combustion chamber for heating water in said water chamber;
- a combustion air inlet pipe including an outlet end communicating with said combustion chamber, and including an inlet end; and
- a generally planar vertical plate connected to said inlet end of said pipe, the plane of the plate extending perpendicularly to the plane of an opening of the inlet end, said plate extending outwardly from and extending across said inlet end so as to substantially prevent horizontal air flow completely past said inlet end; and characterized in that inlet pipe comprises a main conduit, and wherein said inlet end is defined by a downwardly extending elbow portion connected to said conduit.

The plate preferably extends a short distance into the pipe and divides the pipe into two longitudinally extending portions adjacent the inlet end. The plate generally extends along the longitudinal axis of the inlet end. The plate preferably also has a semicircular portion extending out of the inlet end. A hemispherical screen conveniently covers the inlet end of the pipe and the semicircular portion of the diverter plate.

A principal advantage of the invention is the provision of a water heater having an air inlet pipe diverter plate as described above. If wind blows over the inlet end, the diverter plate substantially prevents the creation of a vacuum or negative pressure that could prevent the flow of fresh air to the combustion chamber.

Other features of the invention will become apparent to those skilled in the art upon review of the following

detailed description, claims, and drawings.

Figure 1 is a side elevational view of a water heater embodying the invention and including a combustion air inlet pipe assembly.

Figure 2 is an enlarged side elevational view, partially in section, of the inlet end portion of the pipe assembly.

Figure 2 is a bottom plan view of the inlet end portion of the pipe assembly with portions cut away.

Figure 4 is an exploded view of the inlet end of the pipe assembly.

Figure 1 of the drawings shows a water heater 10 adjacent an outside wall 14 of a structure 16 within which the water heater 10 is housed. The water heater 10 includes a tank 18 defining a water chamber 22. The water heater 10 also includes a combustion chamber 26 beneath the water chamber 22. A flue 28 extends upwardly from the combustion chamber 26 and through the water chamber 22. The water heater 10 also includes a burner 30 in the combustion chamber 26 and a fuel supply conduit 34 connected to the burner 30. The flue 28 exhausts the combustion byproducts from the combustion chamber 26 to a chimney or vent (not shown).

The water heater 10 also includes a combustion air inlet pipe 38 supplying air to the combustion chamber 26 to allow the fuel to burn. The inlet pipe 38 is preferably made of poly vinyl chloride and has an outlet end 42 communicating with the combustion chamber 26 and an inlet end 46 located outside the building 16.

The pipe 38 preferably includes a main conduit 50 extending from the combustion chamber 26 to the outside of the building 16. The pipe 38 also includes an elbow fitting 54 which is connected to the main conduit 50 and which has a 45° elbow joint. The elbow fitting 54 defines the inlet end 46 of the pipe 38 and, as shown in Figure 2, has an inner surface 62 defining a passage 66 and an outer surface 70 defining an outer border 74 adjacent the inlet end 46. The fitting 54 is connected to the main conduit 50 so that the inlet end 46 opens downwardly at a 45° angle with respect to horizontal. The inlet end 46 has a longitudinal axis 78.

The water heater 10 also includes a generally planar diverter plate 82 in the elbow fitting 54. The plate 82 is vertically oriented, extends along the axis 78, and divides the fitting passage 66 into two longitudinally extending portions adjacent the inlet end 46. In the preferred embodiment of the invention, the diverter plate 82 (best shown in Figure 4) has a continuous side edge 86 defining a rectangular inner portion 90 and a semicircular outer portion 94. The inner portion 90 includes spaced side edge segments 98 and 102 parallel to the longitudinal axis 78. The side edge segments 98 and 102 frictionally engage the inner surface 62 of the fitting 54. The continuous side edge 86 also includes a pair of oppositely disposed shoulders 106 and 110 connecting the side edge segments 98 and 102 to the semi-circular

outer portion 94. The shoulders 106 and 110 are perpendicular to the longitudinal axis 78 and abut the end of the fitting 54 to prevent the diverter plate 82 from moving into the inlet pipe 38.

The inlet pipe 38 also includes a screen assembly 114 covering the inlet end 46. The assembly 114 (best shown in Figures 2 and 4) includes a hemispherical screen 118. The screen 118 has an inner surface 122 (Figure 2) which is complementary with, and which may be in contact with, the outer portion 94 of the plate 82. The screen assembly 114 also includes a collar 126 which fits over the outer border 74 of the fitting 54. The screen 118 is soldered to the collar 126. The collar 126 has (see Figure 4) four through bores 130 evenly spaced around the collar 126. Four self-tapping screws 134, 135, 136, and 137, are threaded into respective bores 130 and into the outer border 74 of the fitting 54 to secure the screen assembly 114 to the fitting 54. As shown in Figure 2, two diametrically opposed screws 134 and 136 engage respective side edge segments 98 and 102 of the plate 82 to secure the plate 82 relative to the fitting 54.

As wind blows over the inlet end 46 of the combustion air inlet pipe 38, the plate 82 substantially prevents horizontal air flow completely across the inlet end 46 and thereby prevents the creation of a vacuum or negative pressure which could extinguish combustion in the combustion chamber 26.

In an alternative embodiment (not shown), the diverter plate 82 is mounted to the inlet end 46 of the inlet pipe 38 but does not extend into the inlet pipe 38. Instead, the plate 82 has an inner edge in the plane defined by the inlet end 46 of the inlet pipe 38. In other words, the plate 82 extends only outwardly of the inlet end 46 of the pipe 38.

Various features of the invention are set forth in the following claims.

Claims

1. A water heater comprising:

a tank (18) defining a water chamber (22);
a combustion chamber (26) for heating water in said water chamber (22);
a combustion air inlet pipe (38) including an outlet end (42) communicating with said combustion chamber (26), and including an inlet end (46); characterised in that
a generally planar vertical plate (82) is connected to said inlet end (46) of said pipe (38), the plane of the plate extending perpendicularly to the plane of an opening of the inlet end (46), said plate extending outwardly from and extending across said inlet end (46) so as to substantially prevent horizontal air flow completely past said inlet end (46); and in that inlet pipe

(38) comprises a main conduit (50), and wherein said inlet end (46) is defined by a downwardly extending elbow portion (54) connected to said conduit (50).

2. A water heater as claimed in Claim 1, characterized in that said plate (82) extends into said pipe (38) and divides said inlet pipe (38) into two longitudinally extending portions adjacent said inlet end (46).
3. A water heater as claimed in Claim 1 or Claim 2, characterized in that said plate (82) includes a semi-circular portion (94) extending outwardly of said inlet end (46).
4. A water heater as claimed in Claim 3, characterized in that said inlet pipe (46) includes a hemispherical screen (118) covering said inlet end (46) and said plate (82), and wherein said screen (118) is complementary with said semi-circular portion (94).
5. A water heater as claimed in Claim 4, characterized by a cylindrical collar (126) connecting said screen (118) to said inlet end (46).
6. A water heater as claimed in any one of the preceding claims, characterized in that said elbow portion (54) extends downwardly at a 45° angle with respect to horizontal.
7. A water heater as claimed in any one of the preceding claims, characterized in that said inlet end (46) has a longitudinal axis, and wherein said plate (82) extends along said axis.

Patentansprüche

1. Warmwasserbereiter, der folgende Komponenten umfaßt:

einen Tank (18), der eine Wasserkammer (22) bildet;
einen Feuerraum (26) zum Erhitzen von Wasser in der Wasserkammer (22);
ein Verbrennungsluft-Einlaßrohr (38), das eine Auslaßseite (42) einschließt, die mit dem Feuerraum (26) in Verbindung steht, und das eine Einlaßseite (46) einschließt, dadurch gekennzeichnet; daß
eine allgemein plane, senkrechte Platte (82) mit der Einlaßseite (46) des Rohres (38) verbunden ist, wobei die Ebene der Platte senkrecht zur Ebene einer Öffnung der Einlaßseite (46) verläuft, wobei die Platte von der Einlaßseite (46) nach außen verläuft und sich quer zu dieser erstreckt, um so einen horizontalen Luftstrom vollständig an der Einlaßseite

(46) vorbei im wesentlichen zu verhindern; und dadurch, daß das Einlaßrohr (38) eine Hauptleitung (50) umfaßt, und bei dem die Einlaßseite (46) durch einen nach unten verlaufenden Kniestück-Abschnitt (54) gebildet wird, der mit der Leitung (50) verbunden ist.

2. Warmwasserbereiter nach Anspruch 1, dadurch gekennzeichnet, daß die Platte (82) in das Rohr (38) hinein reicht und das Einlaßrohr (38) in zwei sich in Längsrichtung erstreckende Abschnitte angrenzend an die Einlaßseite (46) unterteilt.

3. Warmwasserbereiter nach Anspruch 1 oder Anspruch 2, dadurch gekennzeichnet, daß die Platte (82) einen halbkreisförmigen Abschnitt (94) einschließt, der sich von der Einlaßseite (46) nach außen erstreckt.

4. Warmwasserbereiter nach Anspruch 3, dadurch gekennzeichnet, daß das Einlaßrohr (46) einen halbkugelförmigen Schutzschirm (118) einschließt, der die Einlaßseite (46) und die Platte (82) bedeckt, und bei dem der Schutzschirm (118) mit dem halbkreisförmigen Abschnitt (94) komplementär ist.

5. Warmwasserbereiter nach Anspruch 4, gekennzeichnet durch einen zylindrischen Bund (126), der den Schutzschirm (118) mit der Einlaßseite (46) verbindet.

6. Warmwasserbereiter nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß der Kniestück-Abschnitt (54) mit einem Winkel von 45° zur Horizontalen nach unten verläuft.

7. Warmwasserbereiter nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß die Einlaßseite (46) eine Längsachse hat, und bei dem sich die Platte (82) längs der genannten Achse erstreckt.

Revendications

1. Chauffe-eau comprenant:

un réservoir (18) définissant une chambre d'eau (22);

une chambre de combustion (26) pour chauffer l'eau dans ladite chambre d'eau (22);

une canalisation d'entrée d'air de combustion (38) comprenant une extrémité d'évacuation (42) qui communique avec ladite chambre de combustion (26) et comprenant une extrémité d'admission (46); caractérisé en ce que

une plaque verticale (82) généralement plane est reliée à ladite extrémité d'admission (46) de

ladite canalisation (38), le plan de la plaque s'étendant perpendiculairement par rapport au plan d'une ouverture de l'extrémité d'admission (46), ladite plaque s'étendant à l'extérieur de ladite extrémité d'admission (46) et en travers de celle-ci de manière à empêcher essentiellement que l'air s'écoule de manière horizontale complètement à travers ladite extrémité d'admission (46); et en ce que la canalisation d'entrée (38) comprend un conduit principal (50), et dans lequel ladite extrémité d'admission (46) est définie par une portion coudée (54) s'étendant vers le bas et reliée au dit conduit (50).

2. Chauffe-eau selon la revendication 1, caractérisé en ce que ladite plaque (82) s'étend dans ladite canalisation (38) et divise ladite canalisation d'entrée (38) en deux portions s'étendant de manière longitudinale et adjacentes à ladite extrémité d'admission (46).

3. Chauffe-eau selon la revendication 1 ou 2, caractérisé en ce que ladite plaque (82) comprend une portion semi-circulaire (94) qui s'étend à l'extérieur de ladite extrémité d'admission (46).

4. Chauffe-eau selon la revendication 3, caractérisé en ce que ladite canalisation d'entrée (46) comprend un écran hémisphérique (118) couvrant ladite extrémité d'admission (46) et ladite plaque (82), et dans lequel ledit écran (118) est complémentaire de ladite portion semi-circulaire (94).

5. Chauffe-eau selon la revendication 4, caractérisé par un collier cylindrique (126) reliant ledit écran (118) à ladite extrémité d'admission (46).

6. Chauffe-eau selon l'une quelconque des revendications précédentes, caractérisé en ce que ladite portion coudée (54) s'étend vers le bas en formant un angle de 45° par rapport à l'horizontale.

7. Chauffe-eau selon l'une quelconque des revendications précédentes, caractérisé en ce que ladite extrémité d'admission (46) a un axe longitudinal, et dans lequel ladite plaque (82) s'étend le long du dit axe.

